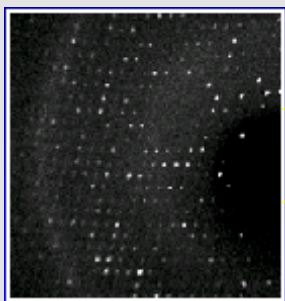


HIV / AIDS



A typical x-ray diffraction pattern from a protein crystal.



"Ribbon" diagram illustrating the protein structure of the HIV capsid protein solved at the NSLS.

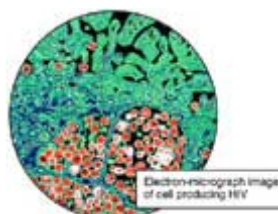
Fast Facts

- 36.1 million people are estimated to be living with HIV/AIDS. Of these, 34.7 million are adults. 16.4 million are women, and 1.4 million are children under 15.
- An estimated 21.8 million people have died from AIDS since the epidemic began. 17.5 million were adults, including 9 million women. 4.3 million were children under 15.
- During 2000, AIDS caused the deaths of an estimated 3 million people, including 1.3 million women and 500,000 children under 15.

Source: U.S. Center for Disease Control

Introduction

HIV (Human Immunodeficiency Virus) is a virus that weakens the body's defense system until it can no longer fight off illnesses such as pneumonia, tuberculosis, cancerous tumors such and others. HIV kills CD4 cells which direct the body's immune system to defend against infection. One is considered to have AIDS (Acquired Immuno-deficiency Syndrome) when the immune system is seriously damaged by HIV. In the United States, an HIV-infected person receives a diagnosis of AIDS when his/her CD4 count is less than 200.



A picture of a cell forming the HIV virus. From <http://www.avert.org>

What are some treatments?

There is still no cure or vaccine for HIV or AIDS. However, there are new drug treatments that can help many people with HIV stay healthy longer, and can delay the onset of AIDS. As a result of these drugs, the number of HIV cases that develop into AIDS-related deaths have dropped dramatically in the United States. However, HIV infection rates remain unchanged.

What has been done at the NSLS?

At the NSLS, the structures of proteins are studied to find cures for various diseases such as the common cold, Lyme disease, AIDS, and many others. Protein crystals are put into a focused X-ray beam, causing the x-rays to diffract. Using that X-ray diffraction pattern, the structure of the protein can be determined. This structure provides scientists with information that they can use for developing drugs to treat a disease. Specifically, an important protein structure involved in the HIV virus was solved at the NSLS by a group led by

Chris Hill at the University of Utah. A key result is that the structure reveals details of capsid dimer formation, which functions in the formation of infectious HIV-1 virions. They have also shown that mutations that weaken dimer formation greatly reduce the formation of infectious virions.

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